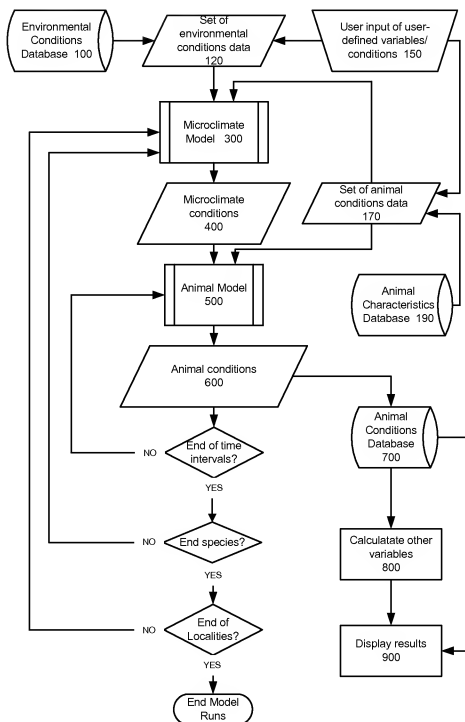
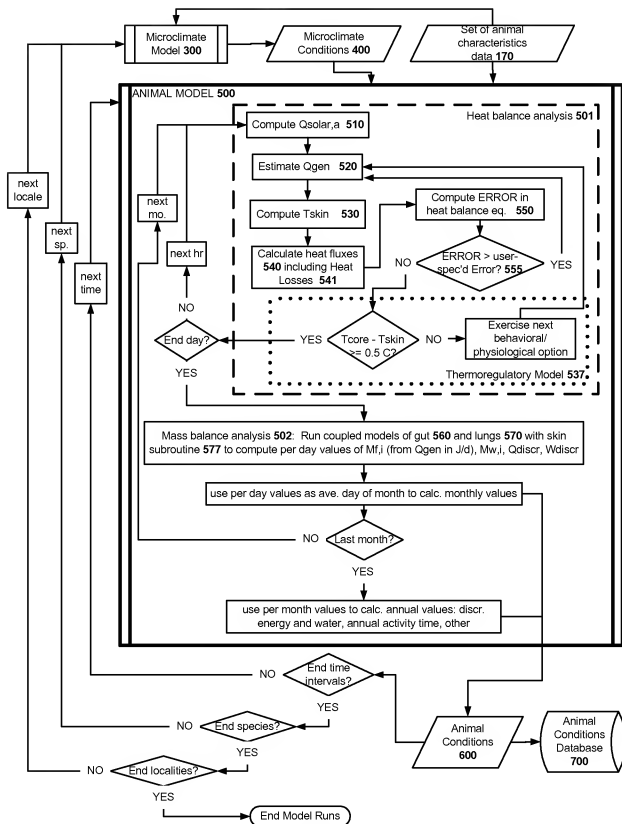
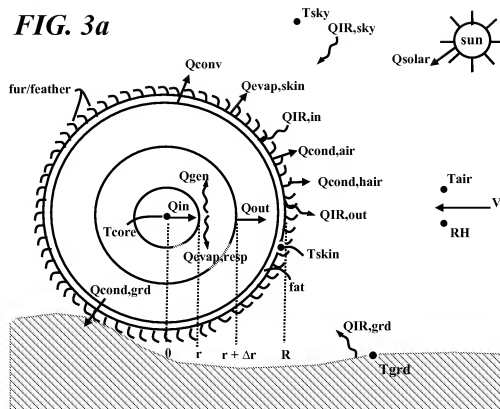
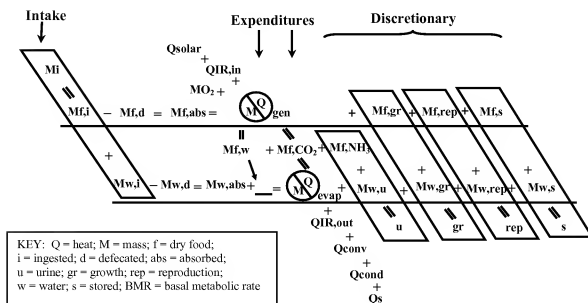
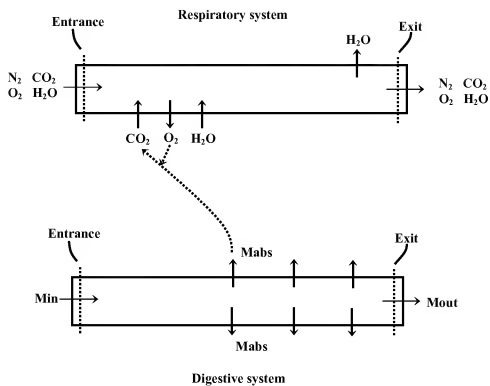


**FIG. 1**

**FIG. 2**

**FIG. 3a****FIG. 3b**

**FIG 4**



**FIG. 5a**

| <b>VARIABLE</b>                | <b>DEFINITION</b>  |
|--------------------------------|--|
| abs                            | Absorbed (unless otherwise noted).   |
| ABSAN                          | Animal absorptivity.   |
| ABSSB                          | The absorptivity of the substrate.   |
| ashade                         | Percent shade on the animal.   |
| ASILN                          | Silhouette area normal to the sun.   |
| BIARA(1)                       | A variable that indicates the optical thickness of the fur or feathers; it is the exponent of Beer's Law ( <i>i.e.</i> the extinction coefficient ( $\tau$ ) times the depth of fur/feathers ( $t$ )). |
| BETARA(2)                      | The IR extinction coefficient of fur/feathers.   |
| BICV                           | A dimensionless variable for convection heat transfer.   |
| BIR                            | A dimensionless variable for IR heat transfer.   |
| C1N                            | Is C1 normalized; a dimensionless variable.  |
| d                              | Defecated  |
| D1                             | D1 is a dimensionless variable.  |
| DigEff                         | Digestive efficiency.  |
| dir                            | Direct.  |
| discr                          | Discretionary.   |
| EMIS                           | The emissivity of the animal.  |
| evap                           | Evaporated.  |
| f                              | Food (dry food).   |
| Fa,grd                         | The configuration factor between the animal and the ground.  |
| Fa,sky                         | The configuration factor between the animal and the sky.   |
| Fabush                         | The configuration factor between the animal and the nearby object.   |
| g                              | The heat generation per unit volume.   |
| gfatpg,<br>gprotpg,<br>gcarbpg | The grams of fat, protein, and carbohydrate per gram dry mass of food .  |
| gr                             | Growth.  |
| grd                            | Ground or other surface.   |
| gundig                         | Undigested mass per gram dry mass of food.   |

**FIG. 5b**

|                      |   |
|----------------------|---|
| gw                   | Grams water.  |
| HC                   | HC is the convection heat transfer coefficient.                               |
| hor                  | Horizontal to.  |
| HR                   | HR is the radiant heat transfer coefficient.                                  |
| i                    | Ingested.   |
| IR                   | Infrared.   |
| Jabspggr             | Joules absorbed per gram of dry food.   |
| K                    | Thermal conductivity for tissue.  |
| KEFAR                | KEFAR is the effective thermal conductivity of fibers and air for conduction. |
| KRADSKY/<br>GRD/BUSH | The fur/feather radiant conductivity in the sky/ground/bush direction.        |
| M                    | Mass.   |
| Mdiscr               | Total discretionary mass; $M_{w, discr} + M_{f, discr}$ .                     |
| met                  | Metabolism.   |
| Mf,a                 | Mass of food absorbed.  |
| Mf,d                 | Mass of food defecated.   |
| Mf, discr            | Total discretionary mass from food; $M_{f, gr} + M_{f, rep} + M_{f, s}$ .     |
| Mf,gr                | Discretionary mass from food available for growth.                            |
| Mf,i                 | Mass of food ingested.  |
| Mf,met               | Mass of food metabolized.   |
| Mf,rep               | Discretionary mass from food available for reproduction.                      |
| Mf,s                 | Discretionary mass from food stored.  |
| Mf,w                 | Mass of water in food absorbed ( $M_{f, a}$ ).                                |
| Mw,a                 | Mass of water absorbed.   |
| Mw,d                 | Mass of water defecated in feces.   |
| Mw, discr            | Total discretionary mass from water ( $M_{w, gr} + M_{w, rep} + M_{w, s}$ ).  |
| Mw,gr                | Discretionary mass from water available for growth.                           |
| Mw,i                 | Mass of water ingested.   |
| Mw,met               | Mass of water metabolized.  |
| Mw,rep               | Discretionary mass from water available for reproduction.                     |
| Mw,s                 | Discretionary mass from water stored.   |
| Mw,u                 | Mass of water excreted in urine.  |
| n                    | Geometry constant (varies with shape).  |
| norm                 | Normal to.  |

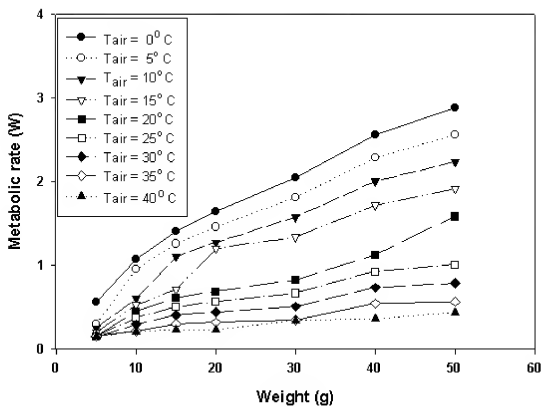
**FIG. 5c**

|                        |   |
|------------------------|---|
| PCTDIF                 | Percent diffuse solar radiation.  |
| pctfat, pctpro, pctcar | User specified percentages of these components of food – fat, protein, carbohydrates.                             |
| PSI                    | PSI is a correction factor.   |
| Q                      | Heat.   |
| Qcond                  | Conduction (via air and fur/feathers) from dorsal and ventral sides of animal.                                    |
| Qcond,air              | Conduction via the air.   |
| Qcond,hair             | Conduction via the fur/feathers.  |
| Qconv                  | Convection at the fur-air interface.  |
| Qdiscr                 | Discretionary energy available to the animal.   |
| Qdorsl                 | Amount of energy absorbed on the top/dorsal parts of animal.  |
| Qevap,resp             | Energy loss by evaporation in respiration.  |
| Qevap,skin             | Energy loss by evaporation at skin.   |
| Qfur                   | Energy flux via the fur/feathers.   |
| Qgen                   | The metabolic heat generation needed to maintain the animal's core temperature.                                   |
| Qin                    | the amount of heat entering the animal from external sources (Qsolar,a, QIR,in, QIR,sky, QIR,grd, other sources). |
| QIR,above              | The IR fluxes from above the animal.  |
| QIR,below              | The IR fluxes from below the animal.  |
| QIR,grd                | IR fluxes from the ground (or other surface).   |
| QIR,in                 | IR radiation emitted inward through the porous insulation.  |
| QIR,out                | IR radiation emitted outward from the fiber elements toward the sky   |
| QIR,sky                | IR fluxes from the sky.   |
| QIR,veg                | IR fluxes from vegetation.  |
| Qmet                   | Uniform heat generation.  |
| Qnet                   | Net heat exchange for the whole animal.   |
| Qnorm                  | Total solar radiation incident on a surface normal to the sun's direct beam.                                      |
| Qout                   | the amount of heat leaving the animal to the environment .  |
| QRADSK/<br>GRD/BUSH    | The incoming solar IR radiation from the sky/ground/bush through the porous media.                                |
| Qresp                  | Uniform heat dissipation by respiration.  |
| QSDIFF                 | The total amount of diffuse solar radiation.  |

**FIG. 5d**

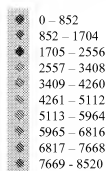
|                                |   |
|--------------------------------|---|
| QSOBJ                          | Incoming diffuse radiation reflected by an object nearby.   |
| Qsolar                         | Clear sky solar radiation.  |
| Qsolar,a                       | Amount of solar radiation (watts) absorbed by the animal.   |
| Qsolar,dir                     | Direct beam solar radiation.  |
| Qsolar,hor                     | The incoming solar radiation on a horizontal surface.   |
| QSRSB                          | The incoming solar radiation reflected from the substrate ( <i>i.e.</i> ground or other substrate).                             |
| QSSKY                          | The diffuse solar radiation from the sky ( <i>i.e.</i> solar radiation scattered by molecules in the atmosphere and by clouds). |
| Qventr                         | Amount of energy absorbed on the bottom/ventral parts of animal.  |
| R                              | Radius of animal.   |
| Rep                            | Reproduction.   |
| resp                           | Respiration.  |
| RH                             | Relative humidity of air passing over the animal at its average height above ground.  |
| RQ                             | Respiratory quotient..  |
| S                              | Stored.   |
| sig                            | The Stefan-Boltzmann constant.  |
| Tair                           | Air temperature at animal's average height.   |
| Tair,2m                        | Temperature of air at 2 m height.   |
| TAVsky/grd/<br>bush            | Sky/ground/bush portions of radiant heat exchange (degrees K).  |
| Tgrd                           | Ground/surface temperature.   |
| Tgrd(i)                        | The ground temperature at location (i).   |
| Timbas                         | Basal multiplier ( <i>i.e.</i> activity above resting).   |
| TK                             | Temperature at degrees Kelvin.  |
| TKair,TKskin,<br>TKsky, TKbush | The temperatures of air, skin, sky, bush, respectively, in degrees K.   |
| TOTCARB                        | Total carbohydrates.  |
| TotJpgram                      | Joules per gram dry food.   |
| Tskin                          | The skin temperature of the animal.   |
| Tsky                           | Clear sky radiant temperature.  |
| Tveg                           | Temperature of vegetation (or other objects) overhead of the animal.  |
| U                              | Urine.  |
| V                              | Velocity of air passing over the animal at its average height above ground.   |
| w                              | Water.  |
| Mw.evap                        | Mass of water lost by evaporation (Mw.evap,resp + Mw.evap,skin).  |
| Mw.evap,resp                   | Water loss by evaporation in respiration.   |
| Mw.evap,skin                   | Water loss by evaporation at skin.  |
| ZFURAR                         | ZFURAR is the depth of fur.   |

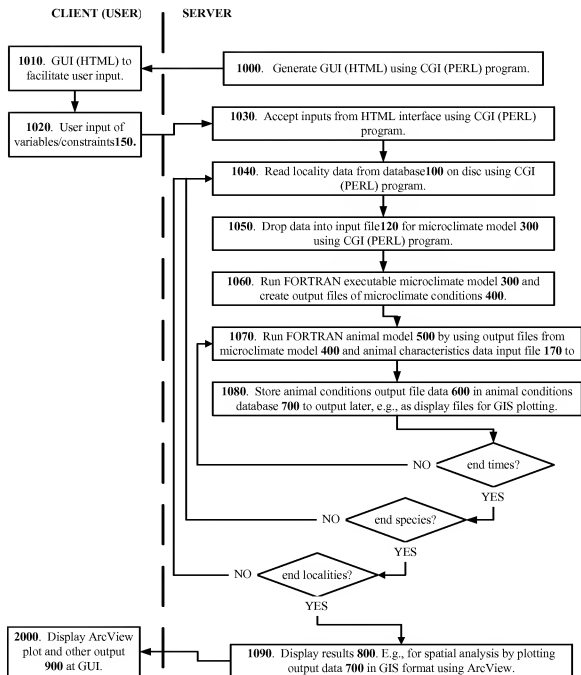


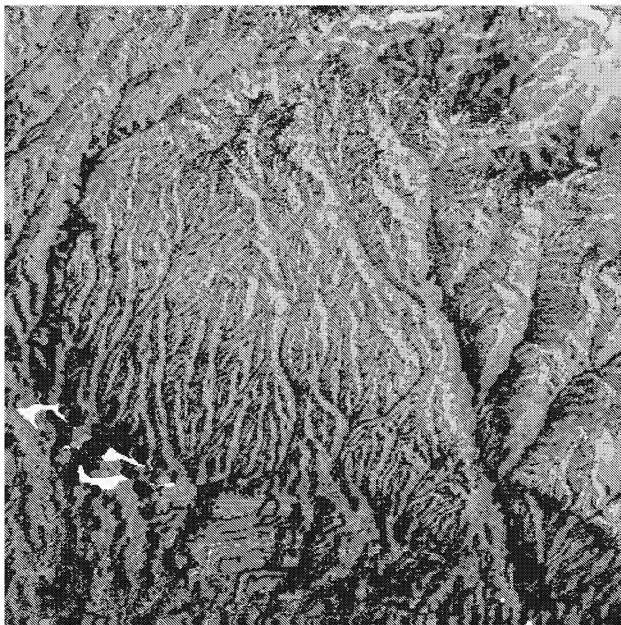
**FIG. 6**

**FIG. 7**

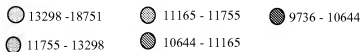
Degree days at 10 cm depth:



**FIG. 8**

**FIG. 9**

**Discretionary energy in July as a function of slope and aspect of topography  
for Mountain Lion (kJ/d)**



**FIG. 10**